Table 1. Summary of hypotheses, corresponding specific predictions, and results.

Hypotheses & Specific Predictions	Supported?	Results
Tree size and microenvironment		
Trees with more exposed crowns have lower drought resistance.		
Taller trees experience greater evaporative demand during the peak growing season months.	yes	Fig. 3
Taller trees have more exposed crowns.	yes	Fig. 3
Taller trees are less drought resistant.		
Rt decreases with height (H).	yes	Fig. 4; Tables S6, S7
Small trees (lower root volume) in drier microhabitats have lower drought resistance.		
There is a negative interactive effect between H and topographic wetness index.	(no)	Tables S6, S7
Species traits		
Species' traits–particularly leaf hydraulic traits–predict drought reistance.		
Wood density correlates (positively or negatively) to Rt.	-	Tables S4, S5
Leaf mass per area correlates positively to Rt.	-	Tables S4, S5
Ring-porous species have higher Rt than diffuse- or semi-ring- porous.	-	Tables S4, S5
Percent loss leaf area upon desiccation correlates negatively with Rt.	yes	Fig. 4; Tables S6, S7
Water potential at turgor loss correlates negatively with Rt.	(yes)	Fig. 4; Tables S6, S7

Parentheses indicate that the prediction was supported by one but not all of the top models (Table S6). Dash symbols indicate that the response was not significant (Table S4), or not represented in any of the top models (Table S6).

Table 2. Summary of dependent and independent variables examined here, along with units, definitions, and sample sizes.

variable	symbol	units	description	category	n*
Dependent variables					
drought resistance	Rt	-	ratio of growth during drought year to mean growth of the 5 years prior.	-	1623
	Rt_{ARIMA}	-	ratio of growth during drought year to growth predicted by ARIMA model.	-	1654
Independent variables					
drought year	Y	-	year of drought	1966	513
				1977	543
				1999	567
tree size					
diameter breast height	DBH	cm	DBH in drought year	-	all
height	H	m	estimated H in drought year	-	all
microhabitat					
crown position		-	2018 crown position	dominant (D)	31
				co-dominant (C)	231
				intermediate (I)	224
				suppressed (S)	101
topographic wetness index	TWI	-	steady-state wetness index based on slope and upstream contributing area	-	all
species' traits					
wood density	WD	g cm^{-3}	dry mass of a unit volume of fresh wood	-	all
leaf mass per area	LMA	kg m^{-2}	ratio of leaf dry mass to fresh leaf area	-	all
xylem porosity		-	vessel arrangement in xylem	ring (R)	408
				semi-ring (SR)	31
				diffuse (D)	178
turgor loss point	π_{tlp}	MPa	water potential at which leaves wilt	-	all
percent loss area	PLA_{dry}	%	percent loss of leaf area upon dessication	-	all

*Sample sizes are prior to removal of outliers. Prior to analysis, we discarded # records with Rt >2 and # records with Rt_{ARIMA} >2.

Table 3. Overview of analyzed species, listed in order of their relative contributions to woody stem productivity ($ANPP_{stem}$) in the plot, along with numbers and sizes sampled, and species traits. Variable abbreviations are as in Table 2.

			DBH (cm)		species traits (mean +/- sd)				
species	$\% ANPP_{stem}$	n trees	mean	range	WD ($g\,cm^{-3}$)	LMA ($g\,cm^{-2}$)	xylem porosity	π_{tlp} (Mpa)	PLA (%)
Liriodendron tulipifera (LITU)	47.1	98	368.54	100 - 1004	0.4 ± 0.03	46.92 ± 12.38	diffuse	-1.92 ± 0.17	19.56 ± 2.06
Quercus alba (QUAL)	10.7	61	471.51	114 - 791	0.61 ± 0.02	75.8 ± 11.05	ring	-2.58 ± 0.08	8.52 ± 0.37
Quercus rubra (QURU)	10.1	69	548.79	110.7 - 1480	0.62 ± 0.02	71.13 ± 6.70	ring	-2.64 ± 0.28	11.01 ± 0.84
Quercus velutina (QUVE)	7.8	77	541.38	160.2 - 1142	0.65 ± 0.04	48.69 ± 3.30	ring	-2.39 ± 0.15	13.42 ± 0.84
Quercus montana (QUPR)	4.8	59	422.48	105 - 872	0.61 ± 0.01	71.77 ± 40.17	ring	-2.36 ± 0.09	11.75 ± 1.37
Fraxinus americana (FRAM)	3.8	62	353.63	64 - 947.3	0.56 ± 0.01	43.28 ± 4.78	ring	-2.1 ± 0.36	13.06 ± 1.06
Carya glabra (CAGL)	3.7	31	313.89	98 - 985	0.62 ± 0.04	42.76 ± 0.94	ring	-2.13 ± 0.50	21.09 ± 5.48
Juglans nigra (JUNI)	2.1	31	481.42	242 - 870	1.09 ± 0.09	72.13 ± 7.10	semi-ring*	-2.76 ± 0.21	24.64 ± 8.72
Carya cordiformis (CACO)	2.0	13	271.87	107 - 615	0.83 ± 0.10	45.86 ± 15.60	ring	-2.13 ± 0.45	17.22 ± 2.25
Carya tomentosa (CATO)	2.0	13	209.74	121 - 322.1	0.83	45.36	ring	-2.2	16.56
Fagus grandifolia (FAGR)	1.5	80	235.11	112 - 1072	0.62 ± 0.03	30.68 ± 4.94	diffuse	-2.57	9.45 ± 1.25
Carya ovalis (CAOVL)	1.1	23	352.87	149 - 660	0.96 ± 0.33	47.6 ± 3.95	ring	-2.48 ± 0.04	14.8 ± 6.34

* Semi-ring porosity is intermediate between ring and diffuse. We group it with diffuse-porous species for more even division of species between categories.

Figure Legends

Figure 1. Height profiles in growing season climatic conditions and tree heights by crown position Shown are averages (± SD) of daily maxima and minima of (**a**) wind speed, (**b**) relative humidity (RH), and (**c**) air temperature (T_{air}) averaged over each month of the peak growing season (May-August) from 2016-2018. In these plots, heights are slightly offset for visualization purposes. Also shown is (**d**) 2018 tree heights by crown position (see Table 2 for codes). In all plots, the dashed horizontal line indicates the 95th percentile of tree heigts in the ForestGEO plot.

Figure 2. Climate and species-level growth responses over our study period, highlighting the three focal drougths (a) and community-wide responses Time series plot (**a**) shows peak growing season (May-August) climate conditions and residual chronologies for each species (see Table 3 for codes). PET and PRE data were obtained from the Climatic Research Unit high-resolution gridded dataset (CRU TS v.4.01; Harris et al. 2014). Focal droughts are indicated by dashed lines, and shading indicates the pre-drought period used in calculations of the resistance metric. Figure modified from Helcoski *et al.* (2019). Density plots (**b**) show the distribution of resistance values for each drought.

Figure 3. Drought resistance, Rt, across species for the three focal droughts. Drought are color coded as in Fig. 1. Species codes are given in Table 3.

Figure 4. . . .

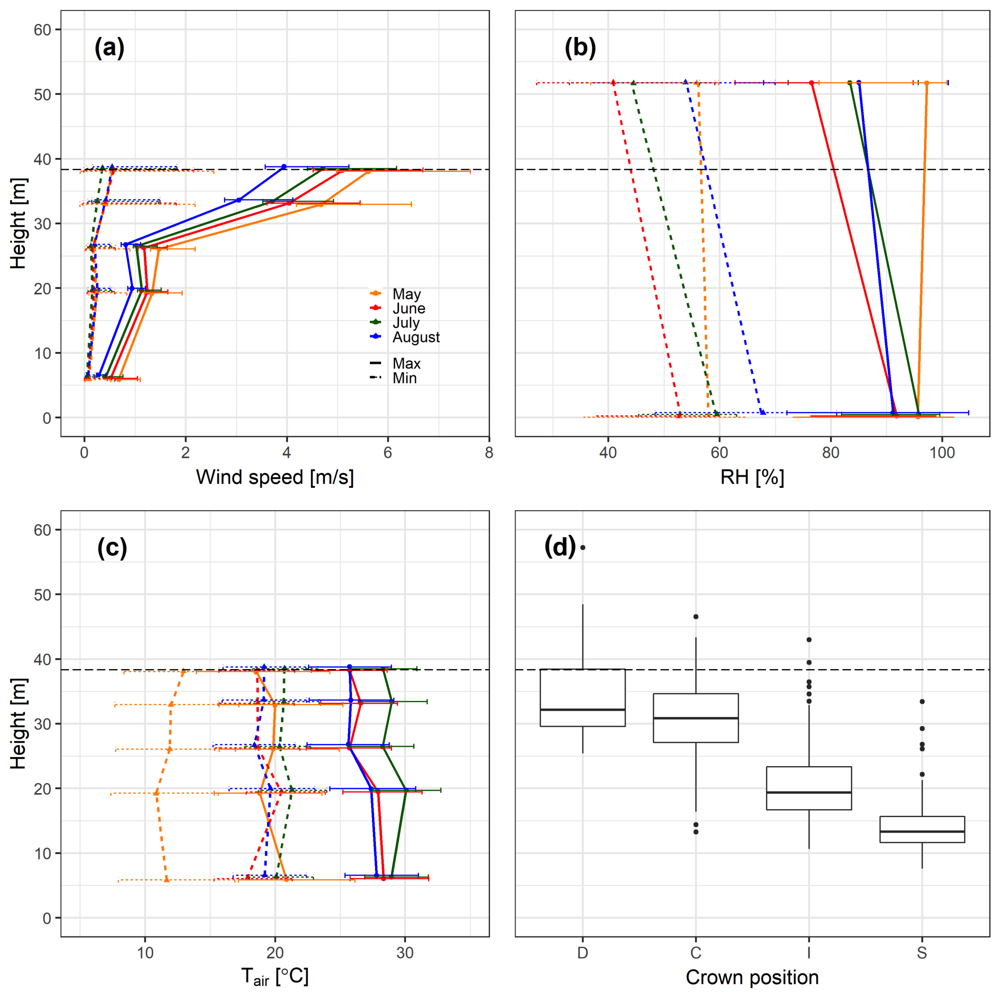
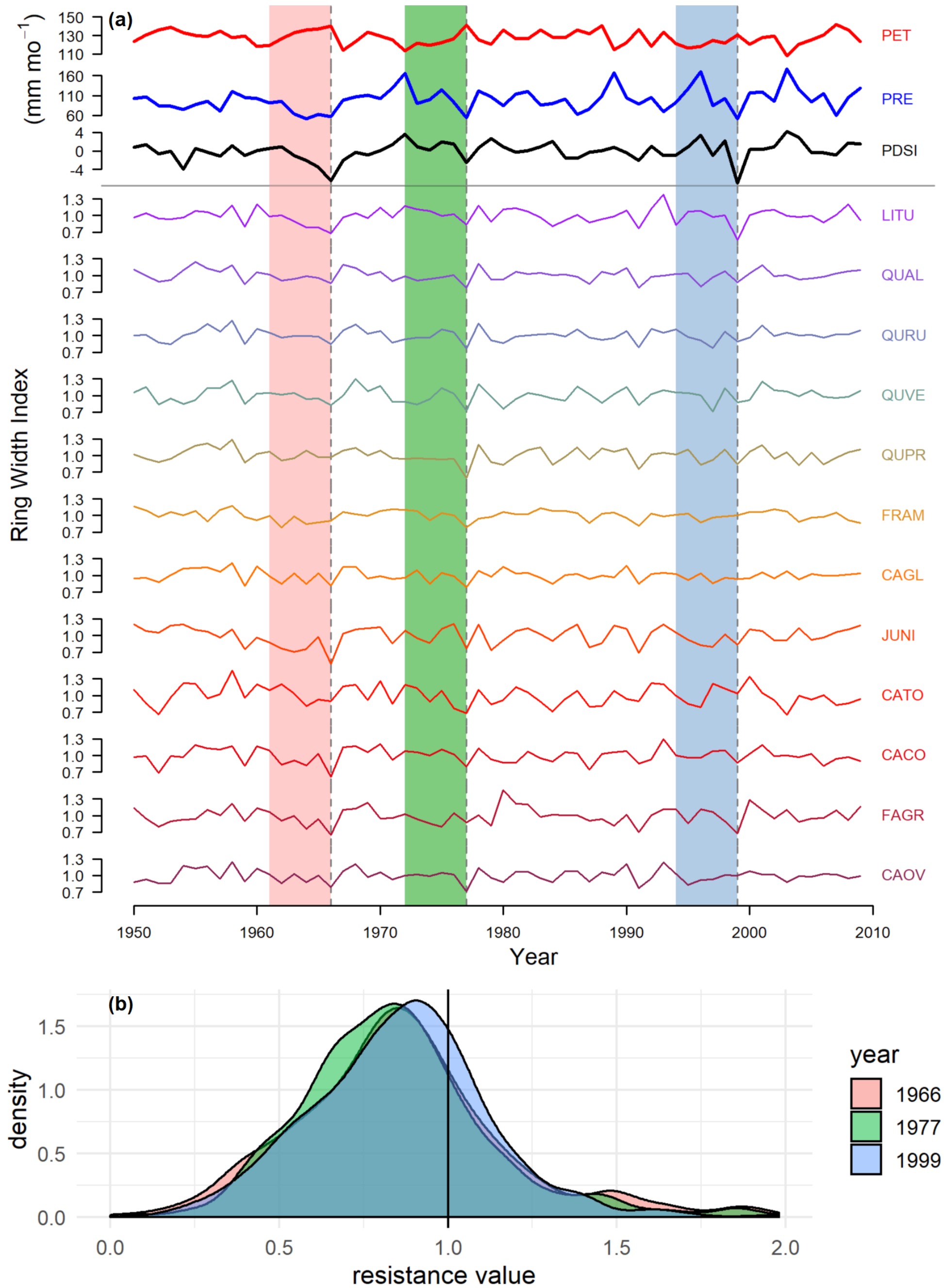


Figure 1. Height profiles in growing season climatic conditions and tree heights by crown position The top row shows averages (± SD) of daily maxima and minima of (a) wind speed, (b) relative humidity (RH), and (c) air temperature (T_{air}) averaged over each month of the peak growing season (May-August) from 2016-2018. In these plots, heights are slightly offset for visualization purposes. Also shown is (d) 2018 tree heights by crown position (see Table 2 for codes). In all plots, the dashed horizontal line indicates the 95th percentile of tree heigts in the ForestGEO plot.



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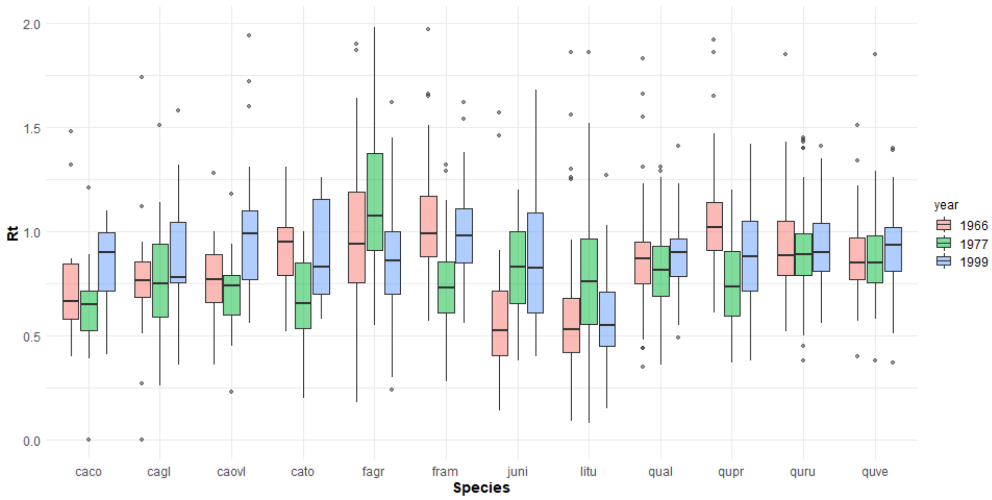

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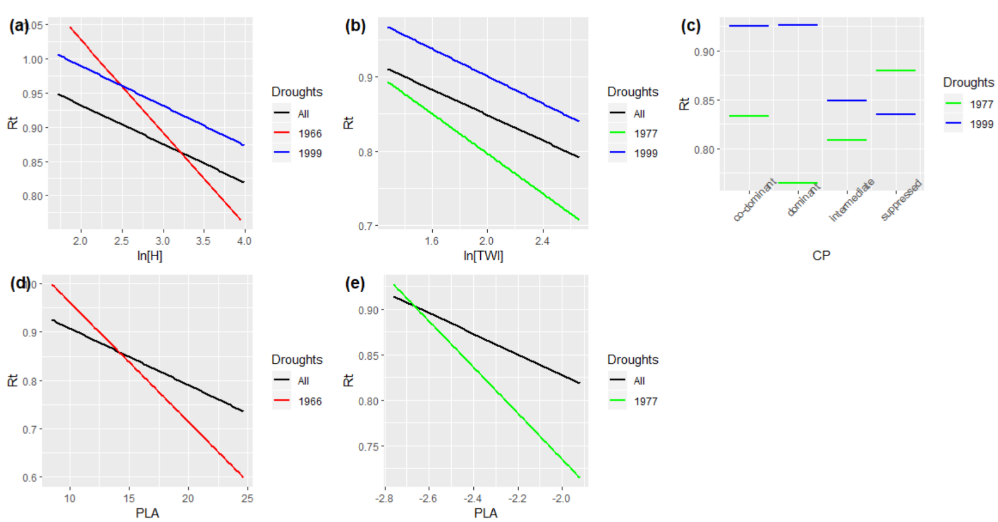

Figure 4. Visualization of best models for all droughts combined and for each drought separately. Model coefficients are given in Table S6. **THIS IS NOT YET CORRECT (having trouble making gg-plot work. THE POSITIVE HEIGHT EFFECT FOR 1999 IS WRONG. FINAL FIG WILL MATCH MODELS IN TABLE S6.**